



The Role Of Child Temperament In Parental Child Feeding Practices And Attitudes Using A Sibling Design

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Abstract

Although previous research indicates that parental child feeding practices are one component of a bidirectional relationship between children and parents, little is known about how child temperament operates in this relationship. The purpose of this study was to investigate relationships between child temperament and parental feeding practices and attitudes using a sibling design. By collecting data regarding pairs of siblings, we were able to investigate sibling differences and differential parental treatment. We examined mothers' and fathers' perceptions of their two children's temperaments as well as reports of the feeding practices and attitudes they use with each child. Fifty-five mothers and fathers completed questionnaires including the Carey Temperament Scales and the Child Feeding Questionnaire (CFQ). Results from correlation analyses showed that 6 of the 9 father reports of temperament between two siblings were positively related, whereas 1 of the 9 mother reports were positively related. Mothers' and fathers' perceptions of temperament were positively correlated for a single child. Some patterns were found between parental reports of sibling temperament and child feeding practices and attitudes, suggesting that temperament plays a role in how parents feed their children.

Introduction

Parental feeding practices and child temperament are important factors in the development of eating behaviors (Carey, Hegvik, & McDevitt, 1988; Faith, Scanton, Birch, Francis, & Sherry, 2004), though few studies have examined links between these concepts (Anzman & Birch, 2009; Blissett & Farrow, 2007). Research indicates that parents with more than one child use similar feeding practices among children (Saelens, Ernst, & Epstein, 2000), but these practices also vary according to characteristics such as child weight, parental concerns about child weight, child-specific eating behaviors, or health status (Farrow, Galloway, & Fraser, 2009; Keller, Pietrobelli, Johnson, & Faith, 2006; Neill, Shultz, Stallings, & Stettler, 2005; Payne, Galloway, & Webb, 2011). The aim of this study is to determine whether differential use of child feeding practices by parents relates to differential child temperament in siblings.

Controlling feeding practices and attitudes, which are typically measured using the Child Feeding Questionnaire (CFQ; Birch et al., 2001), have been linked to energy intake, weight status, eating in the absence of hunger, and decreased fruit and vegetable intake (Savage, Fisher, & Birch, 2007; Ventura & Birch, 2008). Some evidence suggests that controlling feeding practices and attitudes, whether causal or correlational, are linked to unhealthy eating behaviors. One explanation is that they interfere with self-regulatory eating practices (Faith et al., 2004; Farrow & Blissett, 2006). Farrow and Blissett (2006) observed less self-regulatory eating during the first year of life in infants whose mothers used controlling feeding practices and attitudes. Though children gave negative evaluations of restricted snack foods (Fisher & Birch, 2000), in an experimental study, restriction increased the preference of already palatable snack foods (Fisher & Birch, 1999). Though in different ways, these studies suggest that controlling feeding practices interfere with the development of the child's eating behaviors.

Mothers' use of pressure to eat with their 7-year-old daughters predicted daughters' picky eating behavior at 9-years-old (Galloway, Fiorito, Lee, & Birch, 2005). In a repeated-measures experimental design, when researchers encouraged young children to eat specific foods, the children responded by decreasing intake over time for the food encouraged, compared to similar foods not encouraged (Galloway, Fiorito, Francis, & Birch, 2006).

However, while some evidence suggests that controlling feeding practices and attitudes influence unhealthy child eating behavior, the results remain mixed (Gregory, Paxton, & Brozovic,

2010). Restriction of unhealthy food was linked to higher child weight status in some studies (Birch et al., 2001; Francis, Hofer, & Birch, 2001) while other studies found no link (Campbell et al., 2010; Carnell & Wardle, 2007; Crouch, O'Dea, & Battisti, 2007; Webber, Cooke, Hill, & Wardle, 2010). Further, parental control has even been associated with health-enhancing eating behaviors such as less risk of early dieting in girls (Rhee et al., 2010) and reduced intake of energy-dense foods (Sud, Tamayo, Faith, & Keller, 2010). Clearly, other factors are involved.

For instance, parental monitoring of child intake has been positively linked to restrained and emotional eating (Galloway, Farrow, & Martz, 2010) and BMI (Webber et al., 2010a), although parents monitored more after their children completed an obesity treatment intervention (Burrows, Warren, & Collins, 2010). The responsibility a parent feels toward feeding his or her child may be an important variable, though little is known about this construct (Anderson, Hughes, Fisher, & Nicklas, 2005; Keller et al., 2006; O'Neill et al., 2005). In one study, maternal concern that her child would be overweight in the future mediated the positive relationship between BMI and restriction when restriction was the outcome variable (Webber, Hill, Cooke, Carnell, & Wardle, 2010). In another study, child disinhibited eating partially mediated the relationship between restriction and BMI when BMI was the outcome variable (Joyce & Zimmer-Gembeck, 2009). Restriction was also found to predict restriction in a study examining the same sample as the current study (Payne et al., 2011). Whether the parental feeding control is overt or covert (Ogden, Reynolds, & Smith, 2006) and whether the parental feeding style is authoritarian or authoritative (Hughes, Powers, Fisher, Mueller, & Nicklas, 2005) may also be factors involved.

Early research on child temperament has contributed to our understanding of the relationship between child temperament and eating behavior. Carey et al. (1988) used Thomas & Chess' (1977) model of temperament – the way a child usually experiences and responds to internal and external environments – to study the parent–child interaction in the eating context. Carey et al. (1988) reported links between difficult child temperament traits and problem eating behavior. They examined 138 children in a longitudinal study and observed that weight-for-height percentile gains significantly and positively correlated with eight of the nine dimensions on the Carey Temperament Scales (CTS; a high score indicates a more difficult temperamental trait). Other studies have supported this relationship for several of the subscales. For instance, predictability/rhythmicity (Carey et al., 1988; Hagekull, Bohlen, & Rydell, 1997), approach/withdrawal (Carey et al., 1988; Darlington & Wright, 2006; Pliner & Loewen, 1997), persistence, and activity (Carey et al., 1988; Martin et al., 2000) were each associated with problem eating behaviors, though in some cases, findings were mixed. Martin et al. (2000) reported that child temperament is a small, but consistent predictor of eating problems over time. Temperament may be a risk factor that, when combined with other factors, increases vulnerability to eating disturbances (Bulik, Sullivan, Weltzin, & Kaye, 1995; Leon, Fulkerson, Perry, & Early-Zald, 1995).

If child temperament is related to eating behavior in children, it seems likely that there is also a relationship between parental feeding practices/attitudes and child temperament. Hughes, Andersen, Swanson, and Shewchuk (2008) examined the relationship among parent affect, child temperament, feeding strategies, and feeding problems of parents and their preschoolers. Their path analysis showed that child effortful control was linked to positive maternal affect as well as maternally perceived effectiveness of feeding strategies. Additionally, they found that child negativity was directly linked to feeding problems and indirectly linked to feeding problems through parental negative affect. They found that these relationships existed regardless of child weight status.

Anzman and Birch (2009) reported that girls with low inhibitory control were more likely to have higher BMI percentile scores both concurrently and predicatively. Interestingly, they added that parental restrictive feeding moderated the relationship between inhibitory control and weight status. Thus, the relationship between inhibitory control and weight status was the strongest when parents applied a high level of restriction.

The relationship between child temperament and parental feeding practices and attitudes has not been investigated using a sibling study. An advantage of a sibling study is that it allows researchers to understand whether environmental factors encountered by siblings, such as parenting, are shared or nonshared (Keller et al., 2006). Sibling studies have been used to reveal the degree parents use differential feeding practices between siblings in conjunction with differences in eating behaviors, weight status, and the presence of Downs Syndrome (Farrow et al., 2009; Keller et al., 2006; O'Neill et al., 2005; Payne et al., 2011). Keller et al. (2006) found that some parental feeding practices and attitudes (responsibility, perceived child overweight, and monitoring) were common or shared between siblings. However, in other feeding domains (pressure to eat, weight concern, and restriction), parents used different levels of control as child weight status differed. Farrow et al. (2009) followed with a similar study and reported that differences in restriction and pressure to eat were related to differences in sibling eating behaviors. O'Neill et al. (2005) found that parents restricted children with Down Syndrome (DS) more than their non-DS sibling. They also reported that parents pressured DS siblings less compared to their non-DS sibling and that this difference was associated with increased weight status in DS siblings. These studies suggest that restriction and pressure can be considered nonshared environmental factors because siblings in the same household can have different treatment from their parents concerning food.

The purpose of the current study was to investigate the role of sibling temperament in the parent–child feeding interaction with a sibling study design. We were interested in comparing mothers' and fathers' perceptions of temperament in their children. We expected parents to perceive temperamental differences in two siblings and so their temperament scores would be largely unrelated. We also expected that mothers' and fathers' perceptions for individual children would be positively correlated for all temperament dimensions as has been found in longitudinal studies of child personality in preschoolers (Zupancic, Socan, & Kavcic, 2009). We hypothesized that temperament would be related to parental use of child feeding practices and attitudes; in particular, we anticipated that difficult temperament traits would be positively related to more controlling feeding practices and attitudes used by mothers and fathers. We expected that differences between siblings' temperament would be related to differences in parental feeding practices and attitudes, and that parents would report using higher levels of controlling feeding practices and attitudes with siblings who had more difficult temperaments.

Method

Participants

Participants included 55 families consisting of a mother, a father and two biological offspring between the ages of 6 and 12 years. Sibling pairs included all gender combinations: 39.3% two boys, 21.4% two girls, and 39.3% boy–girl pairs. Mean ages (standard deviations) were 10.51 years (1.31 years) for older and 8.30 years (1.30 years) for younger siblings. Mean BMIs (SDs) were 18.17 (3.26) for older and 17.30 (3.11) for younger siblings. Mean BMI percentiles were 55.12 (29.04) for older and 57.70

(28.36) for younger siblings. Mean BMIs were 27.74 (7.52) for fathers and 28.74 (6.40) for mothers.

The current analysis was part of a larger study focusing on sibling developmental issues (Payne et al., 2011) conducted in a university town in the mountains of North Carolina. Approval was obtained by the Appalachian State University Institutional Review Board to ensure that participants would be treated ethically during the study. Recruitment methods included traditional methods of community advertising including flyers, local media, and email listserve announcements. Exclusion criteria, assessed by asking prospective participants in the initial contact, were genetic, physical, or neurological impairments that impede food intake. Informed consent forms were presented to the families prior to data collection and assent was obtained from children. Parents took 1–2 h to complete questionnaires. Mothers were asked to provide four pages more information than fathers, including their children's health history and family demographic information. Families received compensation of \$25 per person (\$100 per family).

Participants were primarily non-Hispanic white and economically homogenous, reflecting the demographics of the rural area in a southeastern U.S. state from which they were drawn: 5.6% reported an annual household income below \$20,000; 14.1% reported an annual household income between \$20,000 and \$35,000; 28.2% reported an annual household income between \$35,000 and \$50,000; and 50.7% reported an annual household income above \$50,000. Fathers worked ($M = 37.1$, $SD = 13.42$) significantly more hours per week than mothers ($M = 22.16$, $SD = 19.15$, $t = 4.03$, $p < 0.001$).

Measures

Child Feeding Questionnaire (CFQ; Birch et al., 2001). The CFQ is a self-report Likert-type measure designed to assess parents' child feeding attitudes, beliefs and practices. Each parent completed questionnaires separately for each child, beginning with the older sibling. Subscales used for the current study were four factors consisting of items assessing parental child feeding practices and attitudes: pressure to eat, restriction, responsibility for feeding, and monitoring. Higher scores indicate higher levels of feeding practices and attitudes. Examinations of the CFQ's psychometric properties revealed internal consistency estimates from 0.70 to 0.92 (Birch et al., 2001; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002).

Carey Temperament Scales (CTS). The Carey Temperament Scales use caregiver reports of children's temperament styles. Parents respond on a scale of 1 = *almost never* to 6 = *almost always* (Hegvik, McDevitt, & Carey, 1982; McDevitt & Carey, 1978). There are two versions of the CTS for use with different age groups. Two separate scales were used. The Behavioral Style Questionnaire (BSQ) was used for 6- and 7-year olds, and the Middle Childhood Temperament Questionnaire (MCTQ) was used for 8- to 12-year olds. The BSQ consists of 100 items, and the MCTQ consists of 99 items to assess 9 dimensions of temperament, including activity, rhythmicity (predictability), approach/withdrawal, adaptability, intensity of reaction, mood, distractibility, persistence, and threshold of responsiveness. Predictability on the MCTQ replaces rhythmicity from the BSQ (Carey et al., 1988), but both are designed to measure the same construct. A high score for each dimension indicates difficult temperament traits and a low score indicates easier behavioral styles (Hegvik et al., 1982; Hepburn & Stone, 2006). Table 1 presents Vachha and Adams (2005) descriptions of all BSQ and MCTQ dimensions.

The BSQ and the MCTQ are easy to administer, are widely used in research, and have an underlying theoretical model (Anderson, 2003). The BSQ is psychometrically sound with good reliability and

Table 1
Definitions of temperament dimensions.

Dimension	Definition
Activity	Motor component in a child's functioning and diurnal proportion of active and inactive periods
Rhythmicity/predictability	Regularity of biological functions (e.g., feeding, sleeping, elimination)
Approach	Nature of the initial response to a new stimulus (new food, toy, person) whether approach or withdrawal
Adaptability	Responses to a new or altered situation
Intensity of reaction	Energy level of a response
Mood	Amount of pleasant, joyful, friendly behavior versus unpleasant, crying, or unfriendly behavior
Distractibility	Effect of extraneous stimuli in interfering with ongoing behavior
Persistence	Continuation of an activity in the face of obstacles
Threshold of responsiveness	The intensity level of stimulation necessary to evoke a discernible response

Note: Table adapted from Vachha and Adams (2005).

validity (McDevitt & Carey, 1978) with test–retest reliability of 0.67–0.94 and Cronbach's alpha values of 0.60–0.80. The MCTQ has been shown to have slightly higher psychometric properties. Test–retest reliability estimates range from 0.80 to 0.93, and internal consistency estimates range from 0.71 to 0.87 (Hegvik et al., as cited by Schor, 1986). In the current study, internal consistency reliabilities of the MCTQ scales were between 0.79 and 0.90, and all but one of the BSQ scales (threshold) were between 0.50 and 0.91 for composite scores based on both parent reports.

Procedures

Trained research assistants introduced participants to the study and seated parents separately from one another while they completed the questionnaires. In addition to completing the CFQ and CTS, mothers also provided demographic and early health and feeding histories for each child. Parents were asked to first complete questionnaires about the older sibling and then for the younger sibling. All older sibling and 37 younger sibling temperament reports were based on the MCTQ, but the temperaments of 18 younger siblings were based on the BSQ. There was no time limit, and parents took approximately 1–2 h to complete the instruments.

Analytic strategy

To address the issue of dependency in the measures, intraclass correlations were calculated to examine the relationship between parent reported scores on two siblings for each temperament dimension, with parallel analyses for mothers and fathers. Pearson product moment correlations were used to examine mothers' and fathers' reports of individual children for each temperament dimension, with parallel analyses for older and younger siblings. Parent mean scores were calculated by averaging mother and father scores from the CFQ, BSQ, and MCTQ. Pearson correlations were calculated between parents' mean scores of the four CFQ dimensions and the nine CTS dimensions, with parallel analyses for the two siblings.

To examine the relationship between sibling differences in temperament and differential parental feeding, differences were calculated between the scores of the sibling pairs for each temperament dimension and for each feeding practice dimension. Pearson product moment correlations were calculated between temperament differences and feeding differences.

Results

Descriptive data

Seventy-seven families originally participated in the study. Data were missing for a variety of reasons such as participants skipping a questionnaire or a page of a questionnaire. Data from 55 families with complete data for the relevant instruments are used in the current analyses. Tables 2 and 3 present means and standard deviations of parent reports from the Carey Temperament Scales and the Child Feeding Questionnaire, respectively.

Parents' perceptions of their sibling children's temperaments

Intraclass correlations between reports of older and younger siblings were different for mothers compared to fathers as shown in Table 4. Low to moderate positive correlations for six of the nine temperament dimensions indicated that fathers tended to report similarly for older and younger children. Mothers' reports of the two siblings were more differentiated, with only one positively correlated temperament dimension, adaptability.

Mother and father concordance of an individual child's temperament

Mothers' and fathers' reports of the same child's temperament were examined using Pearson's correlations. All dimensions of temperament revealed statistically significant positive correlations between parents, with an average correlation of 0.56 for older and 0.50 for younger siblings (see Table 5). These moderate-to-strong correlations indicate agreement between parents regarding the temperaments of their children, which allowed us to combine

the parent reports to achieve more stable composite child temperament scores for subsequent analyses.

Sibling temperament and child feeding practices and attitudes

Each temperament dimension was correlated with each of the four feeding practices and attitudes assessed by the CFQ. Several patterns emerged in both siblings between child temperament and feeding practices and attitudes, while other relationships occurred in only one set of siblings (see Table 6).

Pressure to eat. Parents reported using higher levels of pressure to eat for children who were low in adaptability or low in persistence for both sets of siblings. They pressured older siblings to eat who were low in predictability or high in intensity. Younger siblings who were distractible or tended to withdraw from novel situations were pressured more by parents.

Restriction. For both sets of siblings, parents used more restriction with children who were low in adaptability as well as children who were easily distracted by extraneous stimuli that interfere with ongoing behaviors. Among older siblings only, parents restricted children with higher levels of activity or those who tended not to persist in completion of activities.

Responsibility. Parents reported feeling more responsibility for feeding older and younger children who showed a discernible response to stimulation lower in intensity (low threshold). Among older siblings, parents reported more responsibility for feeding children who were highly active, unpredictable, low in adaptability, likely to have a negative mood, or low in persistence.

Monitoring. Monitoring did not correlate consistently (across both sets of siblings) with any dimension of child temperament.

Table 2

Mean scores and standard deviations (SD) of parent reports of child temperament.

	Father		Mother	
	Older sibling	Younger sibling	Older sibling	Younger sibling
Activity	2.96 (0.81)	3.64 (0.78)	2.97 (1.05)	3.47 (0.89)
Predictability/rhythmicity	2.99 (0.73)	3.04 (0.61)	2.98 (0.80)	2.89 (0.63)
Approach	2.77 (0.85)	3.09 (0.93)	2.73 (1.00)	2.87 (1.04)
Adaptability	2.75 (0.73)	2.79 (0.67)	2.76 (0.87)	2.76 (0.68)
Intensity	3.39 (0.69)	3.88 (0.78)	3.53 (0.93)	3.94 (0.83)
Mood	2.91 (0.76)	3.03 (0.70)	2.88 (1.01)	3.07 (0.70)
Persistence	2.73 (0.79)	3.03 (0.71)	2.78 (0.94)	2.99 (0.82)
Distractibility	3.55 (0.86)	3.73 (0.83)	3.81 (1.03)	3.93 (0.66)
Threshold	3.78 (0.69)	3.73 (0.69)	3.84 (0.65)	3.80 (0.70)

Note: All older ($N=55$) sibling and 37 younger sibling temperament reports were based on the MCTQ. Temperament reports of 18 younger siblings were based on the BSQ. Both the MCTQ and the BSQ use a 6-point Likert type scale. $N=55$. Extreme options: 1 = "Almost never", 6 = "Almost always".

Table 3

Mean scores and standard deviations (SD) of parental feeding practices and attitudes using the Child Feeding Questionnaire.

	Father		Mother	
	Older sibling	Younger sibling	Older sibling	Younger sibling
Pressure to eat	2.63 (1.07)	2.81 (0.98)	2.18 (0.87)	2.34 (1.02)
Restriction	2.92 (0.90)	2.90 (0.75)	2.99 (0.97)	3.03 (0.90)
Responsibility	2.84 (0.78)	2.92 (0.80)	3.88 (0.64)	3.96 (0.69)
Monitoring	3.31 (0.95)	3.40 (0.97)	4.04 (0.69)	3.94 (0.82)

Note: The CFQ uses a 5-point Likert type scale. $N=55$. Extreme options: 1 = "Almost never", 6 = "Almost always".

Table 4

Intraclass correlations of father (F) and mother (M) reported temperament scales of older (S1) and younger (S2) siblings.

	F-S1 and F-S2	M-S1 and M-S2
Activity	−0.012	−0.066
Predictability/rhythmicity	0.406**	0.015
Approach	−0.076	−0.023
Adaptability	0.362**	0.295*
Intensity	0.304*	−0.104
Mood	0.208	0.079
Persistence	0.375**	0.168
Distractibility	0.321*	0.042
Threshold	0.552**	0.088

Note: $N=55$.

* $p < 0.05$.

** $p < 0.01$.

Table 5

Pearson correlations of father (F) and mother (M) reported scales of older (S1) and younger (S2) siblings.

	F-S1 and M-S1	F-S2 and M-S2
Activity	0.514**	0.582**
Predictability/rhythmicity	0.753**	0.666**
Approach	0.594**	0.617**
Adaptability	0.411**	0.415**
Intensity	0.601**	0.394**
Mood	0.687**	0.438**
Persistence	0.687**	0.702**
Distractibility	0.521**	0.377**
Threshold	0.285 [†]	0.337 [†]

Note: N = 55.

[†] $p < 0.05$.

** $p < 0.01$.

However, parents reported more monitoring of older children with low threshold responses to stimulation.

Sibling temperament differences and differential child feeding practices and attitudes

It was hypothesized that when parents perceived a difference in temperament, they would use more controlling feeding practices and attitudes on the child with the more difficult temperamental trait. Therefore, sibling differences in each of the nine temperament traits were correlated with sibling differences in the four child feeding practices/attitudes. Only two statistically significant relationships were revealed. Parents reported using more restriction for the more distractible sibling ($r = 0.329$, $p < 0.05$), and parents reported a greater sense of responsibility for feeding for the child with a more negative mood ($r = 0.296$, $p < 0.05$). These results are not reported in the table. All other relationships between temperament differences and differential child feeding practices/attitudes were not significant.

Discussion

This study is unique in that it examines relationships between child feeding practices/attitudes and sibling temperament using a sibling design with both mother and father reports. Findings from this study indicate that temperament may play a role in parent-child relationships regarding child feeding. Previous research has shown that child feeding practices and attitudes are associated with child weight and parent weight, but this study provides evidence that feeding is also related to child temperament. Several difficult temperamental traits were positively associated with controlling parental feeding practices and attitudes in both older

and younger siblings. However, there were very few relationships between differences in sibling temperament and the differential child feeding practices and attitudes. This suggests that in families with multiple children, feeding practices and attitudes used by parents do not differ much in relation to differences in sibling temperament. Results from this study also show that mothers and fathers may differ in their perceptions of temperament in their sibling children, though they agreed on the behavioral style of a single child.

Parental perceptions of temperament

Fathers' reports of siblings' temperaments were correlated for six of the nine dimensions, whereas mothers' reports revealed only one correlation across siblings. There are several possible explanations for this pattern of findings. Mothers may have been influenced by contrast effects and exaggerated temperamental differences between siblings. Such contrast effects are commonly found in studies of twins (Goldsmith, Buss, & Lemery, 1997; Saudino, Cherny, & Plomin, 2000) and nontwin siblings (Saudino, Wertz, Gagne, & Chawla, 2004). However, fathers may have failed to detect true differences. Fathers in this sample worked significantly more hours than mothers, so it is possible that fewer hours spent with their children resulted in a reduced ability to detect temperament differences. Indeed, these two explanations are not contradictory—the strength of contrast effects is often correlated with how well the reporter (here, the parent) knows the target. Alternatively, this difference could have been an artifact of the research protocol. Mothers who participated in this study were asked to complete more questionnaires than fathers. Therefore, it is possible that the greater number of questionnaires regarding each child completed by mothers (as compared to fathers) served as a buffer, providing more time between the two sibling temperament surveys and reducing possible carryover effects.

Whereas mothers' and fathers' perceptions of sibling temperament were somewhat inconsistent, parents' reports about the temperament of a single child were consistently positively correlated. This pattern provides evidence against a simple response bias on the part of the parents. Stronger consistency in reports for the same child across parents, as compared to across children by the same parent, reveals a strong convergent-discriminant pattern which reinforces the construct validity of the assessment of each child's temperament. In the broader literature, mother-father agreement is stronger with healthy family functioning (Stoneman, Brody, & Burke, 1989), younger children (van Zeijl et al., 2006), and when the child displays less problem behavior in school (Martin & Halverson, 1991). In the current sample, behavior problems and family functioning were not assessed. However, our findings show that reports of older

Table 6

Pearson correlations of temperament reports and parental feeding practices and attitudes using means of father and mother reports for older (S1) and younger (S2) siblings.

	Pressure to eat		Restriction		Responsibility		Monitoring	
	S1	S2	S1	S2	S1	S2	S1	S2
Activity	0.157	0.067	0.291 [†]	0.225	0.313 [†]	0.146	0.197	-0.017
Predictability (rhythmicity)	0.321 [†]	0.169	0.213	0.052	0.320 [†]	0.105	-0.043	-0.069
Approach/withdrawal	0.167	0.284 [†]	-0.138	0.154	-0.043	0.190	0.154	0.142
Adaptability	0.333 [†]	0.281 [†]	0.321 [†]	0.290 [†]	0.397**	0.132	-0.005	0.018
Intensity	0.282 [†]	0.110	0.267	0.260	0.236	0.167	-0.048	0.016
Mood	0.163	0.259	0.218	0.115	0.361 [†]	0.237	-0.069	0.014
Persistence	0.282 [†]	0.378**	0.401**	0.162	0.356**	0.157	-0.002	-0.135
Distractibility	0.152	0.273 [†]	0.341 [†]	0.299 [†]	0.239	-0.028	-0.118	-0.062
Threshold	-0.050	0.162	0.178	0.140	0.395**	0.328 [†]	0.324 [†]	0.086

Note: High scores on the temperament dimensions indicate difficult traits. N = 55.

[†] $p < 0.05$.

** $p < 0.01$.

sibling temperament were slightly more strongly correlated than younger sibling temperament. van Zeijl et al. (2006) found mother–father agreement to be stronger when children were younger, however their research was longitudinal comparing agreement to the same child and they examined infants at 12, 24, and 36 months.

Temperament and parental feeding practices and attitudes

Several patterns emerged in both siblings linking child temperament with parental feeding practices and attitudes. For example, parents were more likely to use pressure to eat for both siblings who did not adapt to new situations or who did not persist in activities. Food neophobia, the rejection of new foods due to distaste, danger or disgust (Martin, 2002), can be overcome with repeated exposure of the food (Addessi, Galloway, Visalberghi, & Birch, 2005). Conceptually, adaptability (to the new food) and persistence (to continue trying the food) are important traits needed to overcome the fear of ingesting new foods. Evidence showing relationships among temperament traits and food neophobia suggest that the unwillingness to ingest unfamiliar foods is not simply a habit, but rather a trait embedded in temperament (Galloway, Lee, & Birch, 2003; Pliner & Loewen, 1997). In the current study, parents' recognition of low levels in adaptability and persistence may have prompted parents to use more pressure to eat during the period when children are cautious of the foods they eat. Pressuring, as a parental feeding practice, may be a likely reaction to difficult temperament traits as mealtime negativity and unsociability at 1 year have been found to predict pressure to eat at two years in a longitudinal study examining this interaction in infants (Blissett & Farrow, 2007).

In the current study, parents tended to report higher levels of restriction in both siblings who were rated low in adaptability or easily distractible. When parents perceived children to be low in adaptability, they may have expected children to slowly adapt to newer, healthy foods and parents would use encouragement or pressure. As parents perceived their children to be easily distracted, they may have perceived the child to have an external locus of control and use the controlling feeding practice, restriction.

Responsibility was moderately related to threshold in both siblings. High threshold scores indicate that the child is more sensitive to stimuli in the environment, exhibiting a stronger reaction to a stimulus than other children do. Parents appear to feel more responsibility for feeding children with more sensitive thresholds, perhaps viewing controlling as a way of attenuating the effects of stimulus variation by stabilizing fluctuations in the child's environment.

Monitoring did not appear to relate consistently to the temperament dimensions (although a statistically significant relationship with threshold was uncovered for older siblings only). This may be due to the more passive nature of monitoring compared to other feeding practices. For example, parents may monitor all eating behavior regardless of child temperament.

Interestingly, significant relationships between temperament and controlling feeding practices and attitudes were found more frequently for older siblings than for the younger siblings. It appears that parents control younger children's eating regardless of temperament. As children grow older and more independent, parents expect their children to take a greater role in eating decisions. However, parents continued to use controlling feeding practices and attitudes when the older children demonstrated difficult temperament traits. Further research is needed to determine the role of age on the relationship between temperament and controlling feeding practices and attitudes.

Sibling differences and differential child feeding practices and attitudes

Nonshared environmental factors, such as differential parental treatment (DPT), can contribute to the development of children's adjustment and personality (Heatherington, Reiss & Plomin, 1994; Plomin & Daniel, 1987). In the parent to child feeding context, some domains have been found to be shared (responsibility for child feeding, perceived child overweight, and monitoring of child eating) and others nonshared (pressure to eat, restriction, and child weight concern) (Keller et al., 2006). Farrow et al. (2009) found that pressure to eat and restriction were nonshared environmental factors relating to differences in child eating behaviors. Although most relationships between differential parental treatment and sibling differences in temperament were not significant in this study, two relationships were significant. Further research, particularly longitudinal approaches with larger samples, is needed to elucidate these relationships.

Limitations

Several limitations from this study should be noted. Most notably, the limited sample size of this study precluded us from having sufficient statistical power to examine additional, potentially explanatory, variables such as child and parent BMI. Although other research has examined the role of BMI in parental feeding practices and attitudes, understanding how multiple child and parent characteristics interact is clearly a necessary line of inquiry. Another limitation of the current investigation is that parents reported temperament using the BSQ for 6- and 7-year olds and the MCTQ for 8- to 12-year olds. Most (67%) sibling pairs fell into the upper age range and were scored using the MCTQ. All older siblings were scored with the MCTQ and 33% of the younger siblings were scored with the BSQ. Though the two measures are derived by the same theoretical basis and have nearly identical dimensions, items are different because they target behaviors appropriate to the respective age groups. Additionally, the Carey Temperament Scales are long (100 or 99 items) and could cause fatigue especially in addition to the other measures participants completed. More broadly, relying solely on parent-reported data, rather than direct behavioral observation, is a further limitation of our study. Finally, although the sample demographics were representative of the geographical region, they cannot be generalized to other populations.

Conclusions

Findings from this study suggest that child temperament may play a role in the development of parent–child interactions regarding food. Parents agreed on the level of temperament for each child, but mothers distinguished between the two children's temperament more than fathers. Although the effect of temperamental differences in siblings is difficult to ascertain, some temperament traits play a role in parental feeding practices and attitude, namely, pressure to eat, restriction, responsibility for feeding. Parents' feeding practices may be influenced by their children's temperament and neophobia. Further research is needed to determine how these relationships change as children grow older.

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